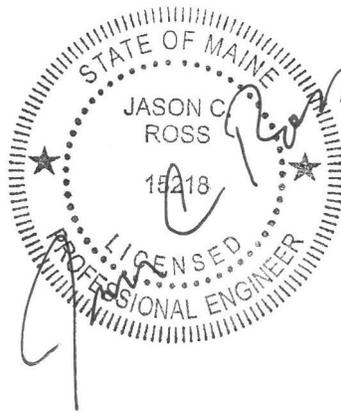


STRUCTURAL ASSESSMENT LETTER REPORT

**LEBANON FIRE STATION
13 UPPER CROSS ROAD
LEBANON, MAINE**

Prepared for:
Town of Lebanon

September 6, 2023

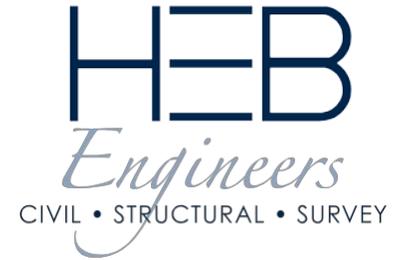


Prepared by:
HEB Engineers, Inc.

Project #2023-076

September 6, 2023

Richard "Chip" Harlow
Town of Lebanon
15 Upper Guinea Road
Lebanon, ME 04027



**Re: Lebanon Fire Station, 13 Upper Cross Road, Lebanon, ME
Structural Assessment Letter Report
HEB Project #2023-076**

Dear Chip,

This Structural Assessment Letter Report has been prepared by HEB Engineers, Inc. (HEB) to address the concerns about the structural integrity of the fire station building located at 13 Upper Cross Road in Lebanon, Maine. On September 1, 2023, I visited the buildings with you, Chief Stefano, and others, to observe and assess the condition of the existing structure. Presented in this Letter Report are my field observations and recommendations. This work was performed per our Letter Agreement, dated and signed August 24, 2023.

Background and Field Observations:

This building was previously observed by HEB in March of 2020, at which time the structure was determined to be in fair condition. The structural assessment report had a list of recommended repairs for the structure to bring it up to meet current code requirements. At the time of the previous site visit, the building was being used to store trucks and equipment but was not permanently inhabited. Part of the rear portion of the building had been condemned due to significant settling of the floor slab.

The existing single-story, concrete masonry unit (CMU), and wood-framed building is approximately 65 feet wide and 60 feet deep. There are three overhead garage doors and one standard entry door along the front (southern side) of the building (see Photo 1 in Appendix A). A frost wall and concrete slab were recently constructed for a new addition on the western side of the building, but the addition was never completed. A portable office trailer was parked on the slab and was being used as the office for Fire Chief Stefano (see Photo 2). The Town is currently considering either repairing the existing building or constructing a new fire station.

The walls of the building are constructed of CMU blocks and extend below grade to a concrete footing. A hole had been dug on the northern side of the building to expose the top of the footing. The footing was observed to be 16 inches below the ground surface (see Photo 3). The footing is exposed, at ground level, at the northeast corner of the building (see Photo 4). Typically, footings are buried 4 feet to protect them from the frost. The exact size of footings and presence of reinforcement is unknown.

The CMU block walls are in fair to poor condition. Based on my observations, it is assumed that the CMU blocks are unreinforced and the cells are not fully grouted. The grout between the blocks is soft and missing in many areas. Moss was observed to be growing between the blocks in several locations near the bottom of the wall (see Photo 5). Portions of the western and southern walls are leaning out approximately ½-inch over 4 feet. There are several cracks in the mortar between the blocks of the western wall some of which have been patched with spray foam and caulking (see Photo 6). Some of the blocks at the top of the western wall have cracked and pushed out from the rest of the wall (see Photo 7). Exterior frames and flashing are missing from two of the windows on the western wall (see Photo 8). The CMU chimney on the northern side of the building is leaning and does not appear to be properly attached to the adjacent wall (see Photo 9).

The floor of the building has a concrete slab-on-grade with a trench drain in the rear portion of the garage bays. The floor slab in the southern portion of the building is in good condition with only minor cracks. You told me that the hole in the floor slab, that was observed in the northwest room during my previous visit, was filled with concrete. You also said that since the repairs, this room has flooded several times due to water leaking through the doorway and exterior western wall (see Photo 10). You told me that there was an issue with the sewer pipes that run under this slab backing up. The sewer pipes were scoped and found to be settling and separating in several locations. The floor slab in the kitchen area is cracked and has settled approximately ½-inch over 2 feet (see Photo 11). The floor slab in the boiler room near the back of the building is cracked and has settled approximately 4 inches over 4 feet near the back door (see Photo 12).

The roof trusses were not observed during this visit but were previously determined to be undersized for the local snow loads. No repairs or reinforcing was done to the roof structure.

Conclusions and Recommendations:

By code, fire stations are essential facilities and need to be designed to a higher standard than residential or storage buildings. This existing building appears to be in fair to poor condition and has continued to deteriorate since the previous visit. Based on observations and previous calculations, the building needs some significant renovations if it is going to be used as a permanent fire station. There are several concerns that need to be addressed including but not limited to the shallow foundations, settling floor slabs, the cracked and leaning CMU walls, and the under-sized wooden roof trusses.

If the existing building is going to continue to be used as the Town's permanent fire station, I recommend that the following items should be addressed:

- » Perform a geotechnical assessment of the site, with borings, to determine the soil bearing capacity and frost susceptibility. Review the adequacy of the existing footings.
- » Remove all of the finishes from the inside of the building in order to view all of the existing structures.
- » Add a horizontal layer of rigid insulation over the existing footings to protect them from frost.
- » Reinforce the existing CMU walls by cutting into the blocks as necessary, installing reinforcing bars, and fully grouting the cells.
- » If necessary, install proper lintels in the CMU walls, and over the doors and windows.
- » Remove mortar and re-point all of the exterior CMU walls.
- » Remove and replace the existing chimney.
- » Remove and replace the existing settled slabs and under-slab piping.
- » Replace or reinforce the existing roof framing to meet current snow-load requirements by adding supports or reinforcing certain members of the trusses. Repair any damaged or rotten truss members as necessary.
- » Replace the existing roofing to prevent additional water damage.
- » Consult with code officials on the sufficiency of the egress, electrical, and mechanical systems.
- » Monitor the building for additional movement.
- » Retain HEB to design repairs.

With the amount of work required to bring this structure up to current building code requirements and the lifespan of the existing structure, the Town should consider constructing a new building that would meet all of the Fire Department's office, training, and storage needs.

Disclaimer:

The opinions and recommendations contained in this report are based on a "walk-through" field investigation performed as part of this work. Only limited calculations were performed to determine if certain structural members are in compliance with adopted building codes and no physical testing was performed. This report does not address any other part of the structure other than those mentioned, nor does it provide any warranty, either express or implied.

Please do not hesitate to contact us if you have any questions or need any additional information.

Sincerely,
HEB Engineers, Inc.



Jason Ross, PE
Senior Structural Engineer

Enclosures: Appendix A – Photo Pages

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APPENDIX A

Photo Page



Photo 1: Front of building.



Photo 2: Frost walls and slab on western side of building.



Photo 3: Hole dug on northern wall to expose footing.



Photo 4: Exposed footing on northeast corner of building.

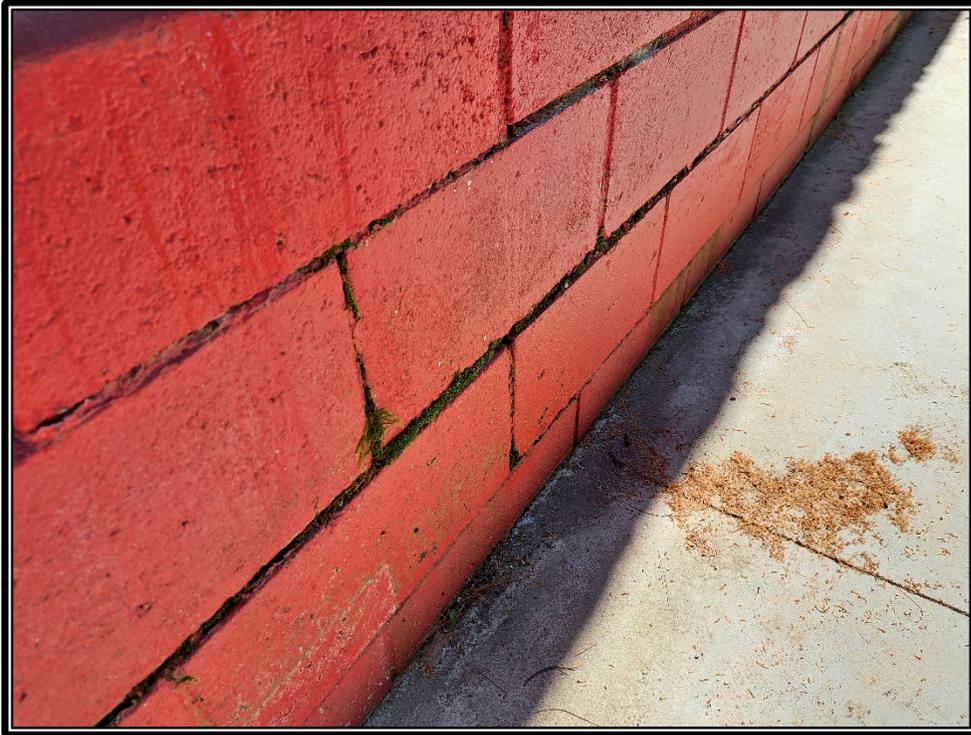


Photo 5: Moss growing mortar between blocks.



Photo 6: Cracks between blocks filled with caulking and spray foam.



Photo 7: Cracked and displace blocks along top of western wall.



Photo 8: Missing window frames.



Photo 9: CMU chimney on northern wall.



Photo 10: Newly repaired slab.



Photo 11: Cracked and settling slab in kitchen.



Photo 12: Cracked and settling slab in boiler room.